HYDROLOGY AND HYDROGEOLOGY ASSESSMENT

Lynas Find

Pilbara Minerals

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1. Introduction

1.1. Background

Pilbara Minerals Limited (PML) owns the Pilgangoora project, comprising a Lithium-Tantalum resource estimated at 157 MT at 1.19 % Li2O, 120 ppm Tantalite (Pilbara Minerals, 2022). PML have developed a standalone operation at Pilgangoora, comprising mining of a series of five active open pits (Monster, Eastern, Central, Southern and Southern End) and an on-site processing facility.

PML are proposing an expansion of their operations to incorporate the Lynas Find resource, for which information on potential surface water and groundwater impacts and details about management strategies are required. This document provides an assessment of the hydrogeology and hydrology associated with Lynas Find pit, based on historical reports and data available for the site.

The Lynas Find development comprises:

- Development of the Lynas Find Pit
- Establishment of a waste dump near Lynas Find Pit

1.2. Locality

The Pilgangoora project shown in Figure 1 is situated approximately 24 km east of the Great Northern Highway and about 88 km south south-east of Port Hedland in the north-eastern Pilbara region of Western Australia. Lynas Find lies on a north-south trending range of hills that form a local watershed between the Turner River East and Strelley River West / De Grey River System.

The general layout of the pits at Pilgangoora is presented in Figure 1. The new Lynas Find pit is situated approximately 600 m northeast of Monster Pit and falls within Tenement M45/1266.

1.3. Land Use

The Project is within the Pilbara groundwater area as proclaimed in 1979 under the Rights and Water and Irrigation Act. The current land uses in the area are predominantly mining and stock raising.

1.4. Lynas Find Development

The general layout of the area close to Lynas Find is shown in Figure 2.

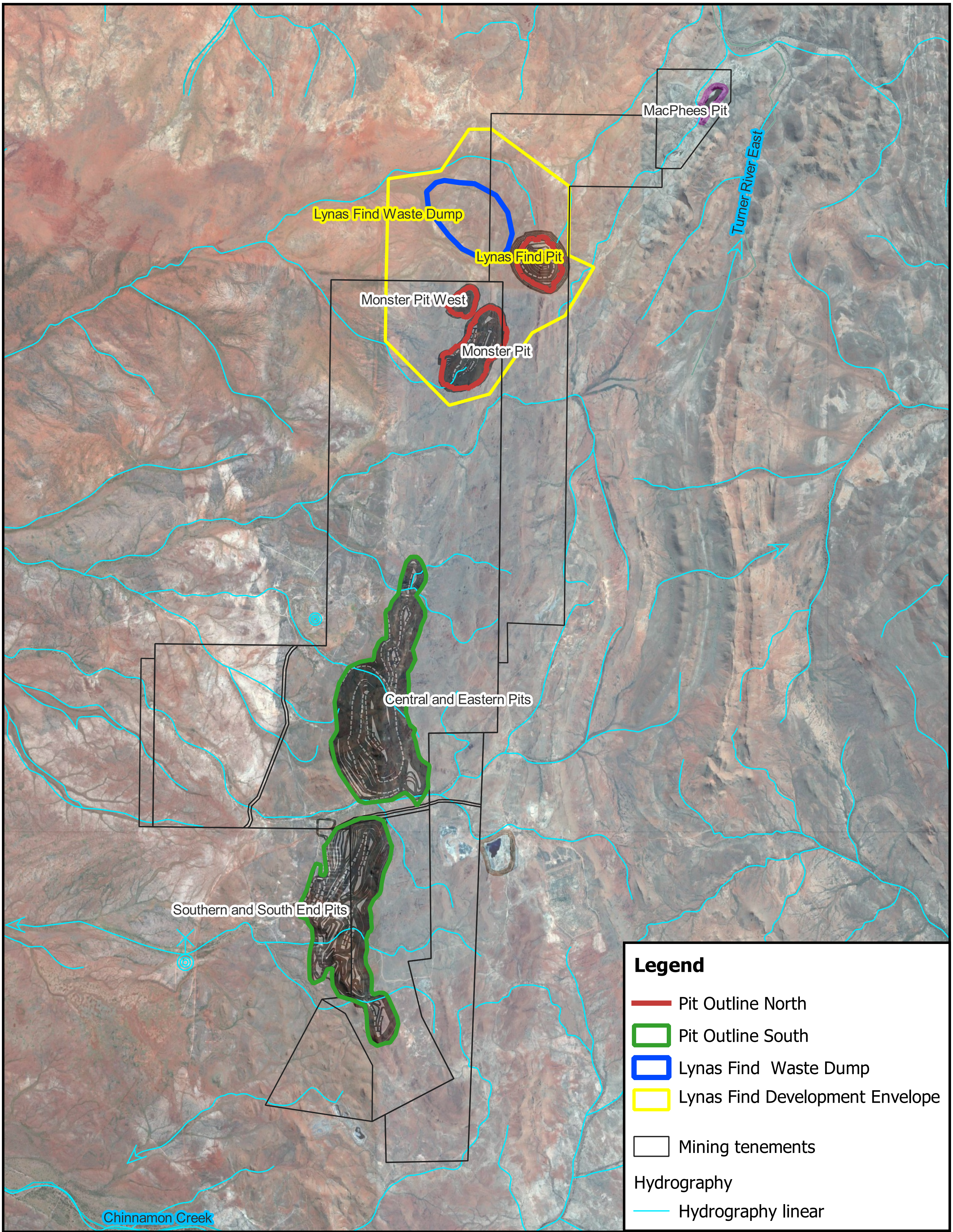
The development of the Lynas Find Pit is planned in two stages:

- Stage 1 – developing the pit to a maximum depth of 190 mAHD for the purpose of providing a direct ship ore product.
- Stage 2 – in the process of being finalised, progresses to 110 mAHD.

Stage 1, to 190 mAHD, does not progress below the prevailing water table at the site and therefore is not anticipated to have any significant impacts on the local groundwater environment (GRM, 2017).

Stage 2, however, is anticipated to extend up to 80 m below the prevailing water table and require dewatering (GRM, 2017).

A waste dump associated with the pit operation is planned in the area to the northwest of the pit.



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GDA94 / MGA zone 50

Figure 1

Site and bore locations

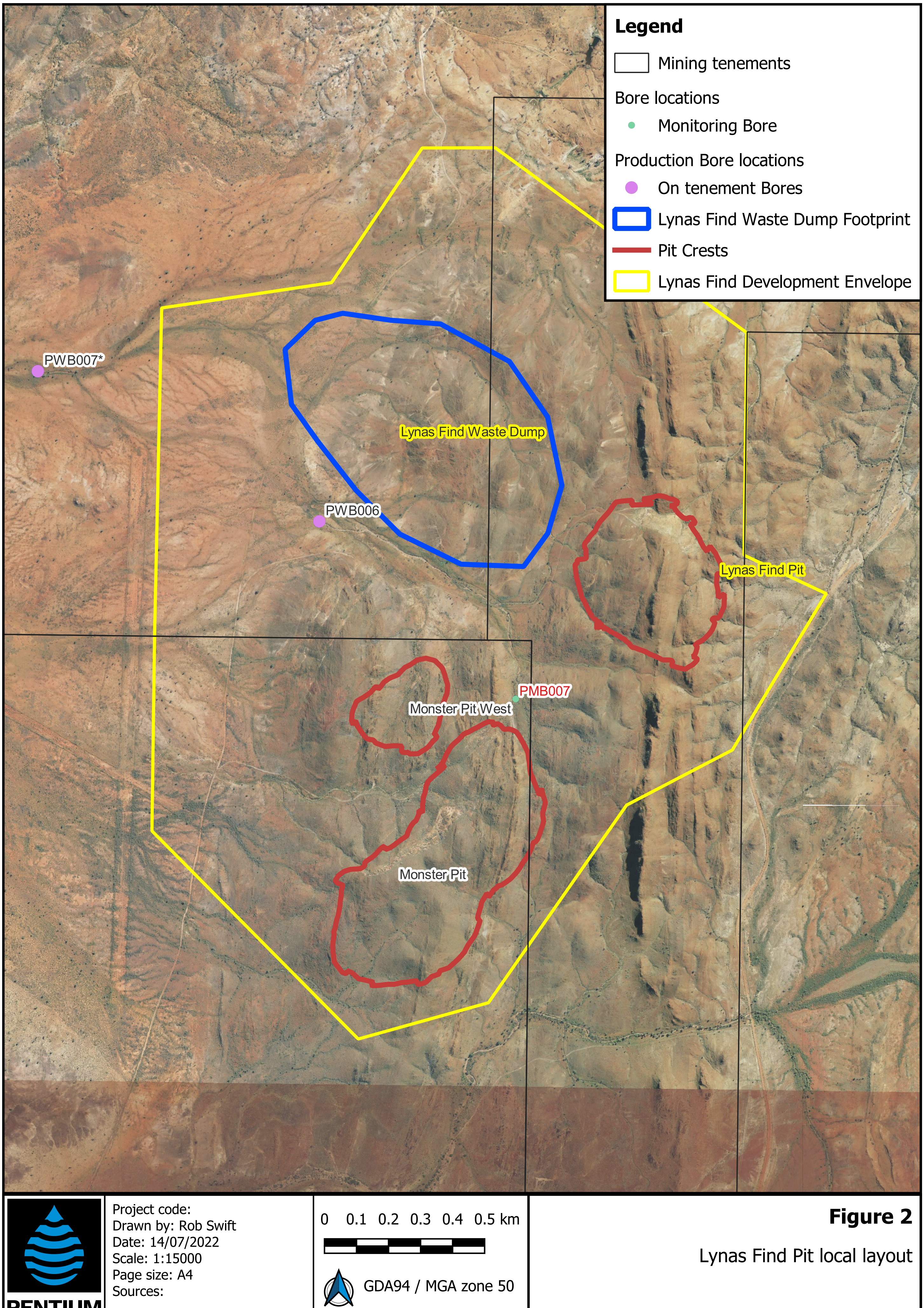

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Figure 2

Lynas Find Pit local layout

1.5. Previous Groundwater investigations

There have been limited groundwater investigations in the immediate environs of Lynas Find Pit. Several studies have been undertaken across the Pilgangoora Project since 2015. The details of these reports have not been included in this report but are relevant to history of the site and have provided the basis for the compilation of this report. These reports have been listed below:

- Pilbara Minerals Pilgangoora Water Options Study, Groundwater Development Services, November 2015
- Pilgangoora Lithium Tantalum Project – Pit Lake Closure Modelling Groundwater Resource Management 2016
- Water Supply Assessment Pilgangoora Lithium Tantalum Project, Groundwater Resource Management 2016
- Dewatering Assessment Pilgangoora Lithium tantalum Project, Groundwater Resource Management, 2016
- Operating Strategy For Pilgangoora Southern Borefield, Groundwater Resource Management, 2017
- Pilgangoora Lithium Tantalum Project- 5 MTPA Hydrogeological Detailed Feasibility Study, Groundwater Resource Management 2018
- Pilgangoora Project – Dakota DSO Pit Hydrogeological Assessment, Groundwater Resource Management 2017
- Preliminary Groundwater Modelling Results - Baldy North Turner East Borefield Groundwater Resource Management 2019
- Pilgangoora Project – Revised Groundwater Modelling Groundwater Resource Management 2019
- Groundwater Monitoring Review Pilbara Minerals Limited Pilgangoora Project Groundwater Resource Management, 2020
- Groundwater Monitoring Summary Pilbara Minerals Limited Pilgangoora Project, Groundwater Resource Management 2021
- Groundwater Monitoring Summary Pilbara Minerals Limited Pilgangoora Project, Groundwater Resource Management 2022

These various reports focus on the existing pits and water supply borefields that support the Pilgangoora Operations.

Hydrogeological investigation around the Lynas Find pit is limited to consideration of the Stage 1 progression (above water table) assessment, part of which involved slug testing of four RC exploration holes (GRM, 2017).

2. Climate/Rainfall

2.1.1. General

The Pilbara region is semi-arid and characterised by highly variable rainfall, both spatially and over time. The climate is dominated by tropical cyclones, which are typically experienced between November to March. These are generally high intensity rainfall and streamflow events. Extended durations without significant rainfall or surface water flow are experienced often within the Pilbara.

The nearest current registered Bureau of Meteorological (BoM) weather station to the project site is at Wallareenya Station. The nearest BoM station with the most complete long term historical rainfall data is Indee Station, 40 km to the north-west. Rainfall is also recorded from a weather station located on site.

Evaporation data is recorded at Port Hedland Airport and Marble Bar and an average of these two stations has been used to provide an estimate of likely evaporation rates. Evaporation for the year is generally an order of magnitude greater that the rainfall totals. Monthly average rainfall data from Indee and Wallareenya presented in Table 1, along with the estimated evaporation data from the average of Port Hedland Airport and Marble Bar.

Table 1: Monthly Rainfall Averages (mm) From 1911-2022 And Estimated Pan Evaporation (BOM)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Indee	68	82	72	20	25	22	9	5	2	1	4	24
Wallareenya	70	83	67	17	22	25	8	4	1	2	4	26
Pan Evap.	358.1	317.3	320.9	288.0	265.1	226.5	203.1	200.0	214.5	262.0	303.0	347.2

The average rainfall data recorded from the site weather station since 2018 is shown in Table 2. The long-term data indicates an average rainfall of 335 mm per year, with most of the rainfall reporting during the months of January to March. The driest months are typically September and October recording on average less than 2 mm.

The onsite weather station data has some data gaps during the monitoring period, this has led to some differences in the base data from the averages for Indee and Wallareenya data. To correct for this any reporting or modelling has the missing data replaced with the same period data from the nearest monitored sites with data.

Table 2: Site Weather Station Monthly Rainfall Totals and Averages (mm) from 2018-2022 (POPL)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	158	46	16.5	0	0	61.5	0	0	0	0	0	0
2019	5	0	341	9.5	0	4.2	0	0	0	0	53	7.5
2020	166.5	279	36.6	19	12	0	0	4	0	1	1.8	216
2021	29.6	66	13	30	0	26	0	0	0	0	0	0
2022	106	35	9	7	142							
Average	93	85.2	83.2	13.1	30.8	22.9	0	1	0	0.2	13.7	55.8

Rainfall distribution is consistent with the long-term data, with most of the rainfall occurring during the summer months.

2.1.2. Rainfall Intensity-Frequency-Depth

Intensity-Frequency-Depth (IFD) data is required to characterise storm rainfall intensities and is provided by BoM. The BoM website provides information for various AEPs (Annual Exceedance Probability). The rainfall intensity data for the site is shown below:

Table 3 Intensity-Frequency-Depth (IFD) (mm)

AEP Duration	63%	50%	20%	10%	5%	2%	1%
1 hour	28	32	47	57	67	81	92
2 hour	34	40	58	72	85	104	120
6 hour	46	54	84	107	130	164	191
12 hour	55	67	108	139	172	219	257
24 hour	66	81	134	174	218	278	325
72 hour	84	104	168	216	266	330	380

2.1.3. Topography

The topography of the project site is determined by the range of hills that it is situated within. These hills provide in the order of 90 m relief with ground elevations rising from about 170 mAHD on the plains to the west of the site to about 260 mAHD within the project site.

The prominent geographic features being Mount York (268 mAHD) located at the south edge of the project area and McPhee Hill (217 mAHD) located 5 kilometres to the north-east.

The project site is in a series of north-south aligned hills which have an altitude of 90m to 100m above the surrounds.

The project also lies 18 km east of the main channel of the Turner River and is in the uppermost extent of the Turner River East tributary and McPhee Creek, a tributary of the East Strelley River.

3. Hydrology and Drainage

3.1.1. General

The Pilbara landscape can be subject to heavy rainfall. Activities such as vegetation and topsoil removal, mining activities, stockpiling and general construction activities substantially increase the risk of erosion, generating coarse and suspended sediment from disturbed land. This can adversely affect downstream water quality, dependent vegetation communities and ecosystems.

The general objective with regards to hydrological processes is to maintain surface water regimes, so that existing and potential users (including the ecosystem) are also protected. Effective erosion, sedimentation and water quality control minimises sedimentation impacts on downstream waterways and the adjacent environment.

3.1.2. Regional Hydrology

The site lies on the eastern side of the Turner River catchment, near the Strelley River catchment boundary. Most of the site lies within the Chinnamon Creek catchment, which has a catchment boundary of ~368 km^2. There are two sub-catchments of Chinnamon Creek that are impacted by the proposed pits and waste dump, these are Northern Creek (Ac ~20.4 km^2) and Houston Creek (Ac ~18.8 km^2). Refer to Figure 4 below for the Lynas Find catchment boundaries.

A portion of the Lynas Find pit lies within the Oakover River (Turner River East tributary) catchment, this has a catchment area of ~800 km^2.

At closure it is assumed that 100% of runoff is lost from the pit areas and 50% runoff is lost from waste dumps.

Monster West Pit, and about half of the Lynas Find and Monster East pits lies within the Northern Creek catchment, these have an approximate total pit area of 0.36 km^2. The Lynas Find waste dump also lies within the Northern Creek catchment, the waste dump has an area of ~0.47 km^2, therefore about 0.23 km^2 area of runoff is lost. This is a total area of runoff loss of about 0.59 km^2, this is ~2.9% of the Northern Creek catchment.

The remaining Monster East pit lies in the Houston Creek catchment and has an area of ~0.22 km^2. This makes up ~1.2% of the Houston Creek catchment area. The remaining area of the Lynas Find pit lies within the Oakover River catchment, an area of about 0.16 km^2. This is ~0.02% of the total Oakover River catchment area. Therefore, the pits and waste dump are not expected to have an impact on downstream flows.

3.1.3. Local Hydrology

The Monster and Lynas Find Pits are located at the top of hills and at the edge of local / regional catchment boundaries. As a result, there are no upstream flows impinging on the creeks and standard pit bunds will be sufficient. As a result, the pits will only be impacted by direct rainfall on the pit.

The Lynas Find waste dump is located near the top of a catchment boundary, there are minimal upstream flows impacting it and therefore no external surface water management (i.e. diversions) is required. Surface water runoff from the waste dump should be captured to prevent dirty water entering the natural creek system. The waste dump should be bunded off to capture water which can then infiltrate / evaporate or be treated in a sedimentation basin and released downstream.

3.1.4. Rainfall on Pits

Flood water collecting in pits needs to be pumped out to allow mining to continue. The pit stormwater management system (i.e., pumping capacity) and flood storage capacity in combination should ideally be able to accommodate the 72-hour rainfall event. DMIRS (Department of Mines, Industry Regulation and Safety) uses the 100 - year (1% AEP) 72-hour rainfall event as a guideline for operational flood storage impacts and is commonly used in “volume” dependent storm events (such as pump out volumes and storm management for pits).

The in-pit volume of water based on direct rainfall over the pit for the 10% AEP and 1% AEP 72-hour rainfalls is shown in table 4 below. It has been assumed that 80% of the rainfall will runoff and accumulate at the bottom of the pit.

Table 4 Approximate in-pit run off volumes (m^3)

Rainfall Event	Monster Pit East	Monster Pit West	Lynas Find
63% AEP 72hrs	25,000	6,000	19,000
50% AEP 72hrs	31,000	7,000	24,000
20% AEP 72hrs	50,000	11,000	39,000
10% AEP 72hrs	64,000	14,000	50,000
2% AEP 72hrs	79,000	18,000	62,000
2% AEP 72hrs	98,000	22,000	77,000
1% AEP 72hrs	112,000	25,000	88,000

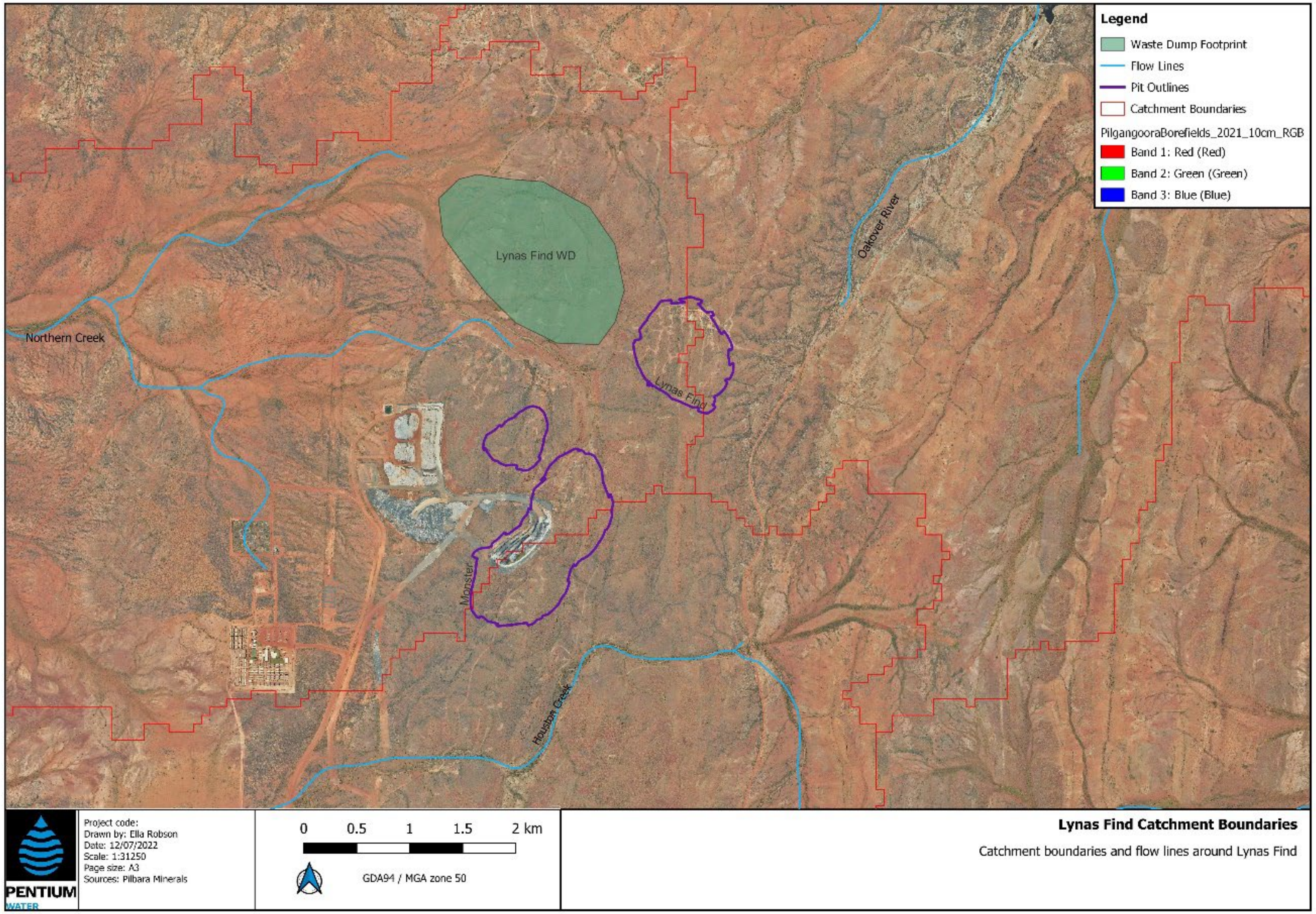

Figure 3 Lynas Find surface water catchment boundaries

4. Geology

4.1.1. Geology - Pilgangoora

Lynas Find is situated with the Archaean Pilbara Craton, comprising granite and greenstone terrain. Lynas Find lies along the Lynas Find Shear Zone within the East Strelley greenstone belt (Blewett and Champion, 2005).

The East Strelley greenstone belt is flanked to the south east and west by granite within the East Pilbara Granite-Greenstone Terrane.

The Pilgangoora pegmatites are hosted in the East Strelley greenstone belt, which is a series of steeply dipping, mafic meta volcanic rocks and amphibolites. At Pilgangoora, the greenstones have been intruded by a swarm of north-trending, east-dipping pegmatites extending from Mount York in the south, northwards for about 11 km to McPhees Mining Centre).

Many of the pegmatites are very large, reaching over 1000 m in length and 200 m to 300 m in width. Despite their large size, mineralisation within these zoned pegmatites appears to be restricted to alternating zones, mainly along vein margins containing quartz, albite, muscovite, and spessartine garnet. These mineralised zones contain varying amounts of lepidolite, spodumene, tantalite, cassiterite, and minor microlite, tapiolite, and beryl (Pilbara Minerals 2015).

Alluvial cover is typically thin or absent in the area and mostly confined to the creek beds and minor drainage systems. The weathering profile in the region is also thin, typically less than 20 m in depth.

4.1.2. Geology – Lynas Find

The local geology of the Lynas Find pit was investigated during the Dakota DSO (Lynas Find) Hydrogeological assessment undertaken in 2017 (GRM, 2017). The lithium ore is hosted in a splayed pegmatite dyke, which dips at about 45° to the south. The pegmatite varies in thickness from about 2 m to 35 m, increasing in thickness to the east, and ultimately terminated by a shear zone which forms the eastern boundary of the proposed pit. The pegmatite intrudes a mafic and ultramafic sequence.

The local geology of the Lynas Find Pit is shown in Figure 5 below.

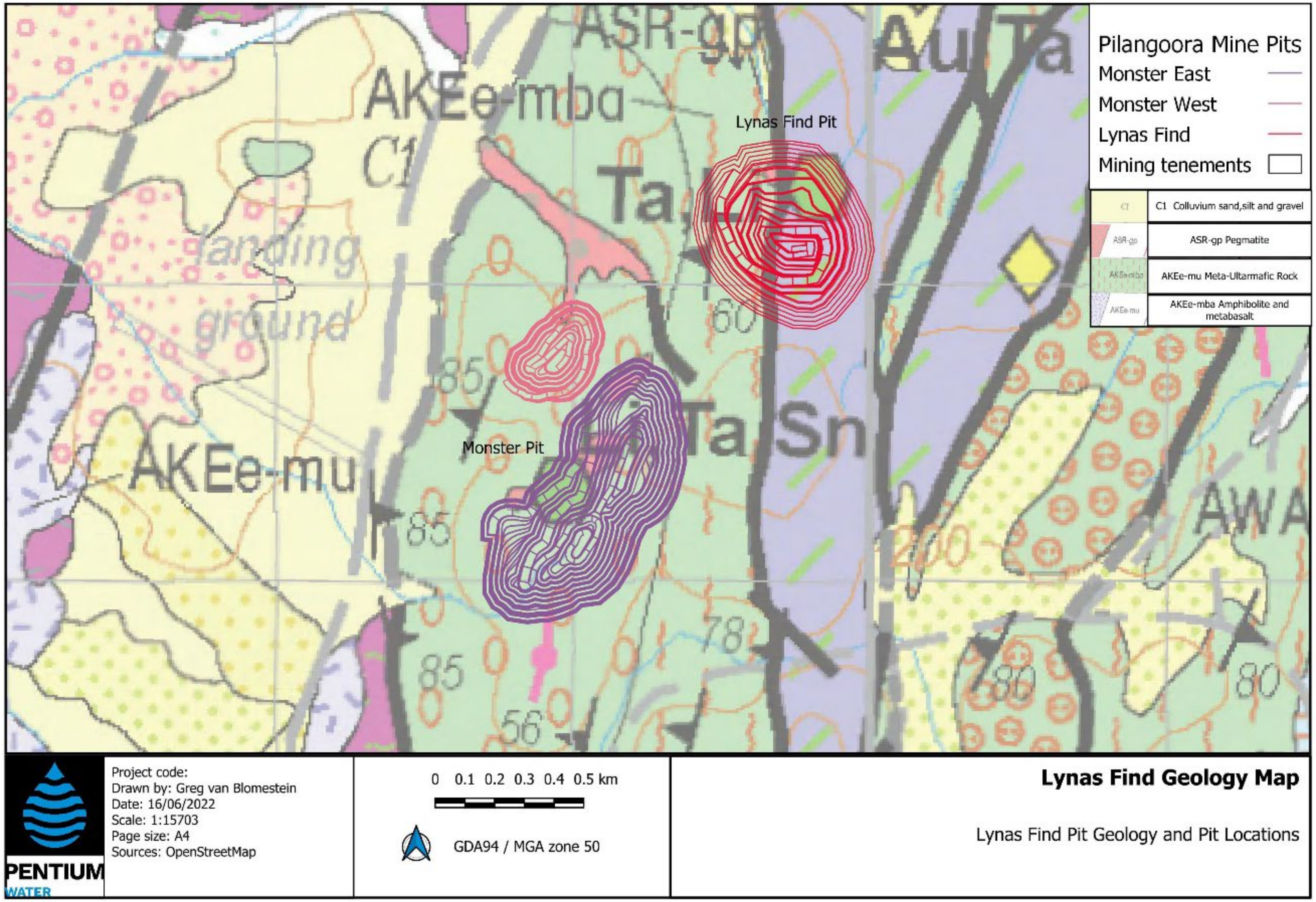

Figure 4: Lynas Find Pit Local Geology

5. Hydrogeology

5.1. Aquifers

5.1.1. Overview

The Pilgangoora project lies within the East Pilbara Granite Greenstone Terrane. There are no highly productive aquifers in this province although fractured rock aquifers are associated with the greenstones and occasional quartz veining (McFarlane DJ (ed.), 2015). Modern sandy alluvial deposts along numerous streamlines and fractures and dykes support Groundwater Dependent Ecosystems.

Data from the broader Pilgangoora project indicates that there is an east to west hydraulic gradient across the site (Figure 6), with a typical depth to groundwater of between 23 mgbl and 53 mbgl.

5.1.2. Lynas Find

Measurement during a slug testing program undertaken at Lynas Find in 2019 (GRM, 2019) identified that the prevailing water table was between 21 mbgl and 35 mbgl (179 mRL to 190 mRL). The average permeability derived from the slug testing was 0.012 m/d, which is considered consistent with the other Pilgangoora Pits.

The southern end of the Lynas Find pit potentially intersects an east-southeasterly oriented linear structure which has also been targeted as part of the 'on-tenement water supply borefield', specifically PWB006 and PWB007. Yields from PWB006 (~700 m west of Lynas Find), are reported to be approximately 2 L/s.

5.2. Groundwater recharge

Groundwater is recharged by direct rainfall or by stream flow during episodic rainfall events. Recharge is predominantly from surface water runoff and flooding events along the upper reaches of Pilgangoora Creek and Houston Creek (a tributary of Chinnamon Creek). Recharge occurs mainly on or adjacent to the groundwater divide and along drainage lines.

5.3. Groundwater throughflow

The hydrogeology of the Pilgangoora project area is characterised by an east to west draining system, with the groundwater divide coincident with the catchment divide (GRM, 2022). Throughflow is therefore considered to be limited given the setting at the top of the groundwater catchment.

5.4. Groundwater monitoring and water quality

There are no groundwater monitoring bores in the immediate environs of Lynas Find pit. Water quality data are limited – sampling from the nearby Monster Pit in 2020 was considered to be predominantly rainwater. Across the Pilgangoora site groundwater is typically neutral to slightly alkaline (pH 7.8 to 8.2), fresh to slightly brackish (TDS ranging from 710 to 4,000 mg/L) with a sodium chloride type water (GMR, 2021). The water quality at Lynas Find would be expected to be broadly consistent with that reported elsewhere at the Pilgangoora site.

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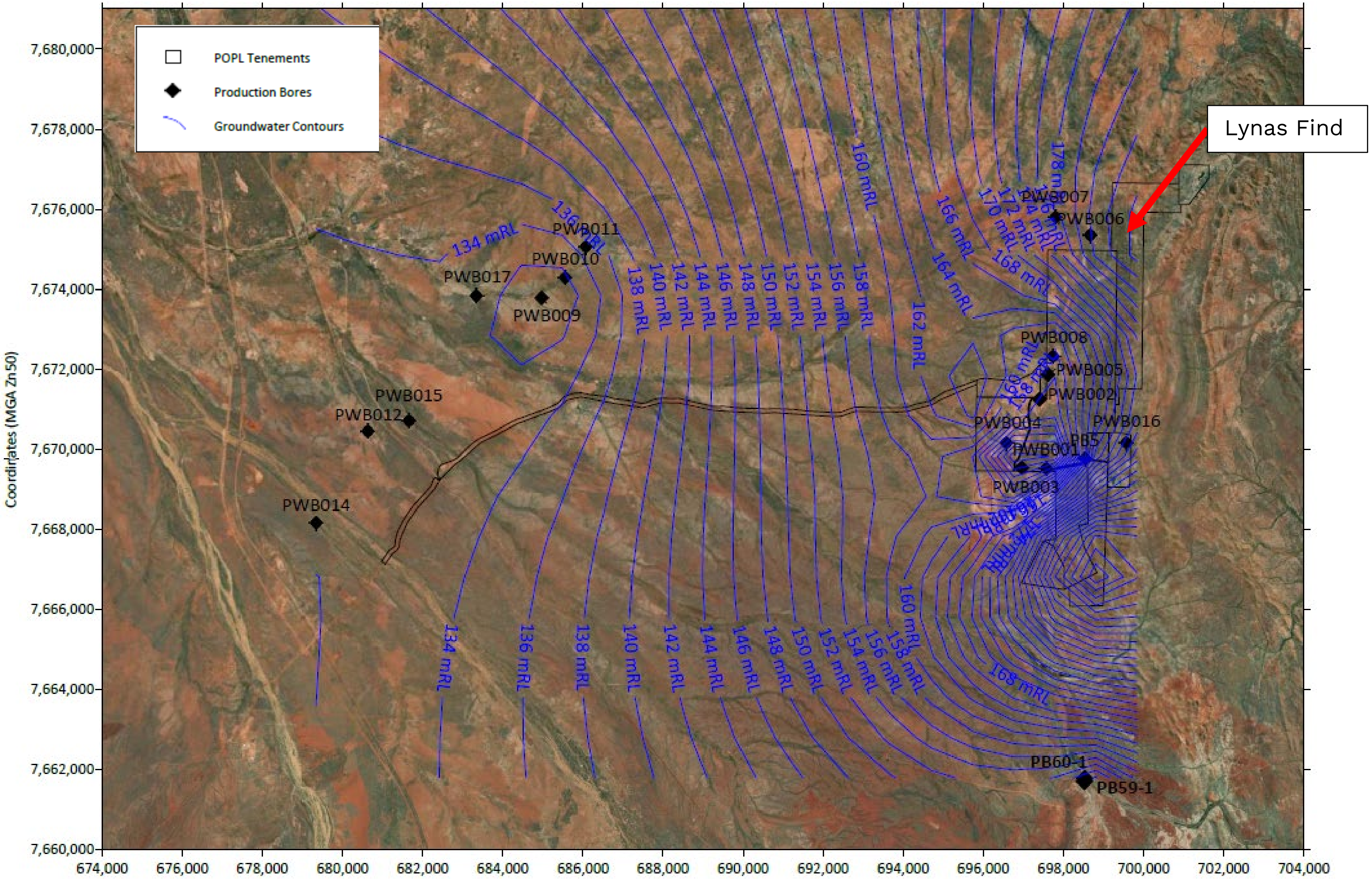

Figure 5: Groundwater Levels 2022 (GRM 2022)

6. Pit Progression and Dewatering

6.1. Pit Progression

Lynas Find is planned to gradually progress to a depth of 110 mAHD, as summarised in Table 5. There are several years where progression of the pit is on hiatus (years 8, 12, 16 to 20). Initial mining activity (Year 6 of the current mine plan) is to 190 mAHD, above the anticipated prevailing groundwater elevation at the site, however further progression to depth is anticipated to encounter groundwater.

Table 5 Lynas Find Pit Progression, including estimate bench and water volumes

Year of operation	Lowest Bench (mRL)	Approximate radius of pit (m)	Estimated volume of progression (m^3)	Estimated volume of water (m^3) (based on Sy 0.05)
6	190	185		
7, 9, 10	170	150	1769240	88460
11	165	140	330390	16520
13	150	90	633030	31650
14	130	60	278555	13930
15	115	40	75398	3770
21 / 24	110	20	14660	730

6.2. Analytical model setup

Due to the lack of site-specific hydrogeological data for Lynas Find a simple analytical model was considered appropriate to provide a high-level assessment of potential dewatering volumes and associated impacts.

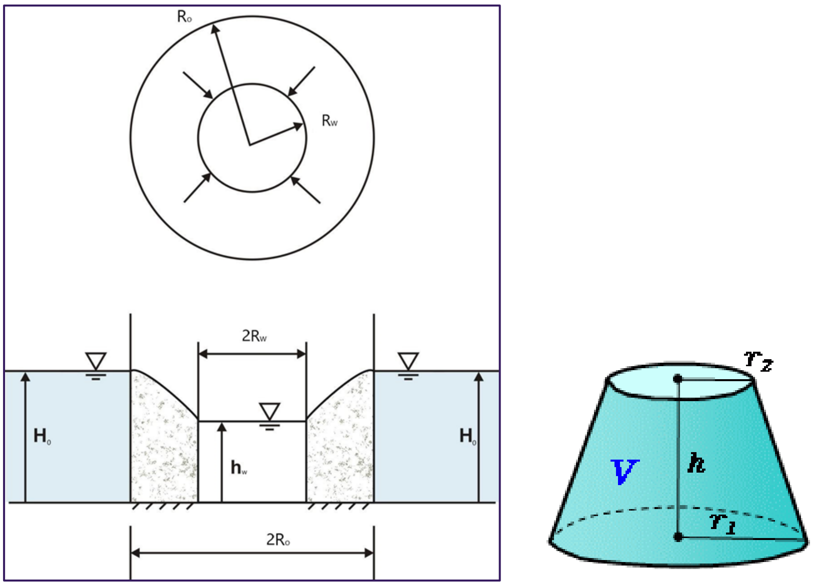

Figure 6: Radial flow into a circular excavation in an unconfined aquifer (Neville,2017) and volume of a truncated cone

6.2.1. Radial flow into a circular excavation

Based on the Dupuit-Thiem equation for unconfined aquifer conditions (below) (Fetter, 1988, Powers et al., 2007), mine inflows to maintain dry mining have been estimated for years 6 to 24, when the pit progresses below water table. A nominal hydraulic conductivity of 0.005 m/d, based on slug testing at Lynas Find, reflective of the range of permeabilities encountered. The simple setup of the model is summarised in Figure 6.

$$Q = \pi k \frac{ho^2 - hw^2}{\ln(ro/rw)}$$

Q = abstraction volume

K = hydraulic conductivity (m/d) (0.005 m/d)

ho = height of SWL above base of aquifer (assumed to be ~105 mRL (5m below base of pit))

hw = height of water level in pit (nominally 185 mRL)

rw = equivalent radius of pit

ro = maximum extent of cone of drawdown (SQRT(2.25 k.ho.t/Sy)

t = time since pumping or inflow started

Sy = specific yield, 0.05 as per Pilgangoora numerical model (GMR, 2018)

The radius of influence (ro, above) is calculated based on a rearrangement of the Jacob equation (Powers et al. 2007). The most reliable means of defining this is through a pumping test which would help identify potential recharge from other aquifers and recharge boundaries, but in the absence of this it is considered to provide a reasonable estimation of the likely radius of influence at this Order of Magnitude stage of assessment. The results of this are summarised in Table 6.

6.2.2. Volume of water within each bench

To include the volume of water within the pit shell itself a calculation considering the pit as a simple truncated cone was used (see Figure 6). The estimated total volume of water within each bench progression is presented in Table 5 and summarised as an equivalent rate (assuming the whole bench is removed in one year, for simplicity) in Table 6.

$$Volume, V = \frac{1}{3}\pi\,(r_1^2 + r_1 r_2 + r_2^2)h$$

r_1 = radius of upper surface (upper bench)

r_2 = radius of lower surface (lower bench)

h = difference in bench elevation

Table 6 Analytical model results

Year of operation	Bench elevation (mRL)	Step (days)	Time (days)	Hw-end of step (m)	Equivalent radius of pit (m)	Extent of cone of depression (ro end of step) (m)	Inflow – end of step (L/s)	Water removed from storage (L/s)
6	190	Above WT						
7	170	365	365	65	150	84	*	~3 L/s
8	170	365	730	65	150	118	*	-
9	170	365	1095	65	150	145	*	-
10	170	365	1460	65	150	167	5.1	-
11	165	365	1825	60	140	187	2.3	0.5 L/s
12	165	365	2190	60	140	205	1.7	-
13	150	365	2555	45	90	221	1.1	1 L/s
14	130	365	2920	25	60	236	0.9	0.5 L/s
15	115	365	3285	10	40	251	0.7	0.1
16	115	365	3650	10	40	264	0.7	-
17	115	365	4015	10	40	277	0.7	-
18	115	365	4380	10	40	289	0.7	-
19	115	365	4745	10	40	301	0.6	-
20	115	365	5110	10	40	313	0.6	-
21	110	365	5475	5	20	324	0.5	<0.1 L/s
22	110	365	5840	5	20	334	0.5	-
23	110	365	6205	5	20	344	0.5	-
24	110	365	6570	5	20	354	0.5	-

Note * model not valid at early time (ro calculated within pit rw)

Based on current data, indicating low prevailing permeability, inflows are anticipated to be limited. The extent of drawdown is also anticipated to be limited, not extending a significant distance from the pit, and focussed on fractured aquifer networks.

Due to the low permeability and reducing pit dimensions with progression to depth as the radius of influence expands the volume of incoming water is anticipated to reduce over time, from an initial approximate value of ~5 L/s to less than 1 L/s late on when most of the orebody is dewatered.

The dewatering strategy has not been defined yet, but it is anticipated that a dewatering bore (or two) supplemented with in-pit sump pumping would be required to adequately control groundwater inflows and allow for advanced dewatering of the orebody.

6.3. Uncertainty

Lynas Find is situated close to a northerly trending fault structure, which may act as a local fractured aquifer system. Further investigation is recommended to improve the hydrogeological understanding of the area around Lynas Find and refine any modelling associated with the deposit.

6.4. Site wide groundwater modelling

There is a site wide numerical groundwater model that has been constructed to assess the dewatering and impacts associated with the various other pits and water supply bores at the Pilgangoora project. It is recommended that this is updated to incorporate the Lynas Find deposit.

7. Groundwater receptors

7.1.1. On Tenement Borefield

There is one bore of the Pilbara Minerals on-tenement borefield (PWB006) which lies approximately 800 m west of the Lynas Find pit along a north westerly trending lineament. As the Lynas Find pit develops there is a risk, if the pit and bore are hydraulically connected, that drawdown associated with ongoing dewatering of Lynas Find may impact the performance of this bore.

7.1.2. Third Party Groundwater users

There are no groundwater protection zones or water reserves within 25 km of the Lynas Find pit. Most licenced users are 15 km to 20 km from the Pilgangoora project, with the exception of the Breccia Borefield operated by Mineral Resources which is approximately 5 km south of the Pilgangoora site, approximately 15 km south of Lynas Find pit.

There are no regionally significant aquifers in the envrions of the Lynas Find pit and dewatering impacts are anticipated to be localised to close to the pit itself. Therefore, no nearby groundwater users anticipated to be impacted by dewatering activity at Lynas Find.

7.1.3. Groundwater Dependent Ecosystems

A desktop review was undertaken by Groundwater Development Services in November 2015 to identify potential GDEs in the area. From this review it was determined that there are no listed wetlands within 25 kilometres of the project (GDS, 2015). There is limited spring development in the area and are those that do exist are assumed to flow seasonally and represent short term discharges of locally recharged groundwater.

Water levels in the Lynas Find area range between 21 mbgl to 35 mbgl, below the depth at which a GDE would realistically be expected to access groundwater.

A review of the Bureau of Meteorology's (BoM's) GDE Atlas indicated that the area of the Pilgangoora project are classified as

- no to low potential for groundwater interaction with vegetation reliant on subsurface groundwater
- no identified subterranean GDEs (caves or aquifers).

GDS' review identified thirty-five areas where GDE's could be present in a 25 km radius of the Pilgangoora project. These potential locations are shown in Figure 7 and described below.

- 9 sites, approximately 18 km to 24 km southwest and west, associated with the Turner River system.
- 10 sites, 15 to 25 km NNW in the upper reaches of the East Turner River tributary
- 5 sites, approximately 22 km NE in the upper Strelley River East and adjacent tributary forming McPhee Creek.
- 2 sites, approximately 25 km E in the upper Six Mile Creek, a tributary of the Strelley River.
- 9 aboriginal heritage sites are located to the northeast, east, southeast and south. These heritage sites could be associated with spring occurrences.

Based on the localised extent of impacts associated with the Lynas Find pit, it is anticipated that any potential impacts to GDEs will be minimal.

Given the present level of groundwater and surface water assessment, it is assumed that potential impacts to any groundwater dependant ecosystem (GDE) from development of the project will be minimal.

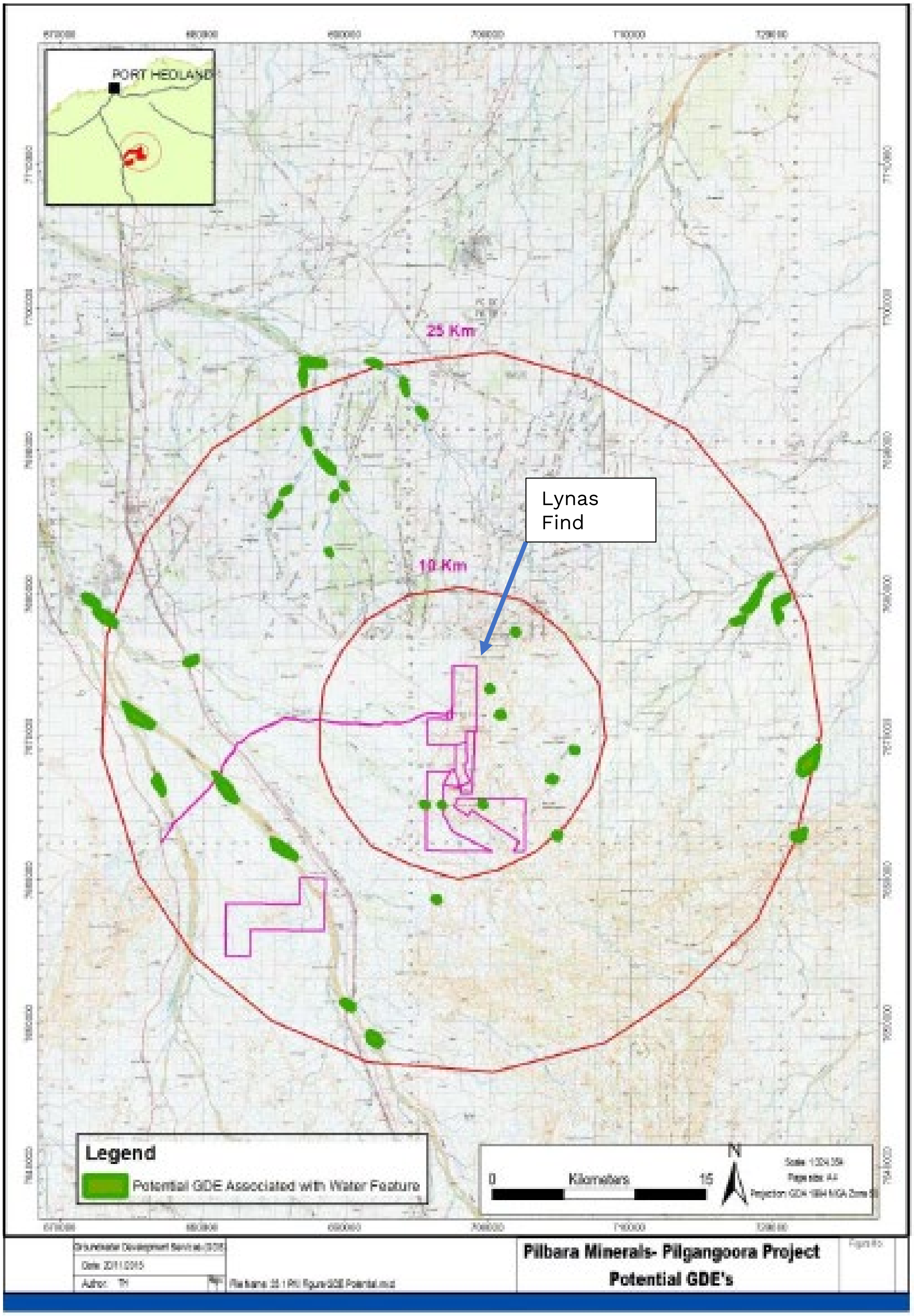

Figure 7: Potential GDE locations (GDS,2015)

7.1.4. Subterranean Fauna

7.1.4.1. Stygofauna

Stygofauna are groundwater dwelling fauna which are adapted for the subterranean environment. They are known to be present in a variety of rock types including Karst (limestone), fissured rock (e.g. granite) and porous rock (e.g. alluvium).

A desktop review and reconnaissance survey for the Pilgangoora project area was completed in 2016 (Bennelongia, 2016a, b), extending as far as the Monster Pit, approximately 500 m southwest of Lynas Find. The findings indicated a moderately rich stygofauna habitat with the known distribution of five of the species identified outside the project area. The report concludes that:

- Stygofauna species were primarily associated with Pilgangoora Creek and had habitat extents beyond the anticipated areas of impact from dewatering.
- The Pilgangoora project was considered unlikely to pose a significant threat to the conservation values of stygofauna.

Lynas Find is situated in a similar geological and hydrogeological setting to other pits at the site, therefore it is anticipated that the impacts on stygofauna habitats Lynas Find would be similarly low as the remainder of the Pilgangoora operations.

7.1.4.2. Troglofauna

There is limited alluvial cover at the site, with most of the site being exposed bedrock. Therefore, there is limited available habitat for potential troglofauna. Fractures and weathering features that occur within the bedrock and the alluvial deposits within the river/stream beds. The permeability of these bedrocks is known to be generally low, from the test pumping that has occurred onsite. The fractures that do occur have also been shown to extend well beyond the limits of the mining envelopes.

Bennelongia, 2016 (b), identified two species of troglofauna in the pit areas of the Pilgangoora project, and concluded:

- it is likely that, with little difference in lithology between the mine pits and surrounding mafic rock and basalts, troglofauna habitats extend beyond the pit footprint.
- The Pilgangoora project is unlikely to pose a significant threat to the conservation values of troglofauna.

Lynas Find is situated in a similar geological and hydrogeological setting to other pits at the site, therefore it is anticipated that the impacts on troglofauna habitats from Lynas Find would be similarly low as the remainder of the Pilgangoora operations.

8. Conclusions and recommendations

8.1. Conclusions

8.1.1. Surface water

- Lynas Find Pit is situated at the top of regional catchment boundaries with no upstream flows impinging on the creeks – standard pit bunds will be sufficient
- The pit will only be impacted by direct rainfall
- Lynas Find waste dump is located near the top of a catchment boundary, with minimal upstream flows – therefore no surface water management (i.e. diversions) is required.
- Surface water run-off from the waste dump should be captured to prevent mixing with the natural creek system. The waste dump should be bunded to capture water which can then infiltrate / evaporate or be treated in a sediment basin and released downstream

8.1.2. Groundwater

- Lynas Find pit is planned to progress to a depth of ~110 mAHD, approximately 80 m below the prevailing water table in a low permeability fractured rock aquifer.
- Long term groundwater inflows are anticipated to be of the order of 5 L/s or less.
- There are no nearby groundwater dependent ecosystems or groundwater users that may be detrimentally impacted by dewatering at Lynas Find.
- Previous assessment of the stygofauna / troglofauna habitats at the Pilgangoora project determined the mine operations presented a low risk to these potentially sensitive receptors. Lynas Find, being of similar geological and hydrogeological setting, is considered to present a similarly low risk.

8.2. Recommendations

Historically limited investigation into the Lynas Find deposit has been undertaken from a hydrogeological perspective, therefore the following are recommended:

- Installation and testing of 4 monitoring bores in the environs of the pit to provide an indication of groundwater inflow zones and rates and assess the potential influence on structural features (northerly trending faults) encountered at Lynas Find, indicative locations are shown in Figure 8 and Table 7. These could also form part of baseline and ongoing monitoring – in terms of water levels and water quality.
- Update / refinement of the simple analytical modelling undertaken to date to incorporate the findings of any additional investigation.
- Review and update the existing numerical groundwater model for the Pilgangoora site to include the proposed bench progression of the Lynas Find deposit and assess likely dewatering volumes, local impacts and post closure recovery.
- Update of the site water balance to incorporate the Lynas Find dewatering volumes / water requirements.

Table 7 Potential monitoring bore locations

Site ID	Easting	Northing	Objective	Note
LF_2022_MB1	699758	7675121	In pit – assess yields / inflow zones.	Could put in a production bore too to test hydraulics of the aquifer.
LF_2022_MB2	699671	7675487	Ex-pit – targeting northerly trending structure	
LF_2022_MB3	699696	7674840	Ex-pit – targeting northerly and easterly trending structure	
LF_2022_MB4	699409	7675241	Ex-pit – targeting basement	

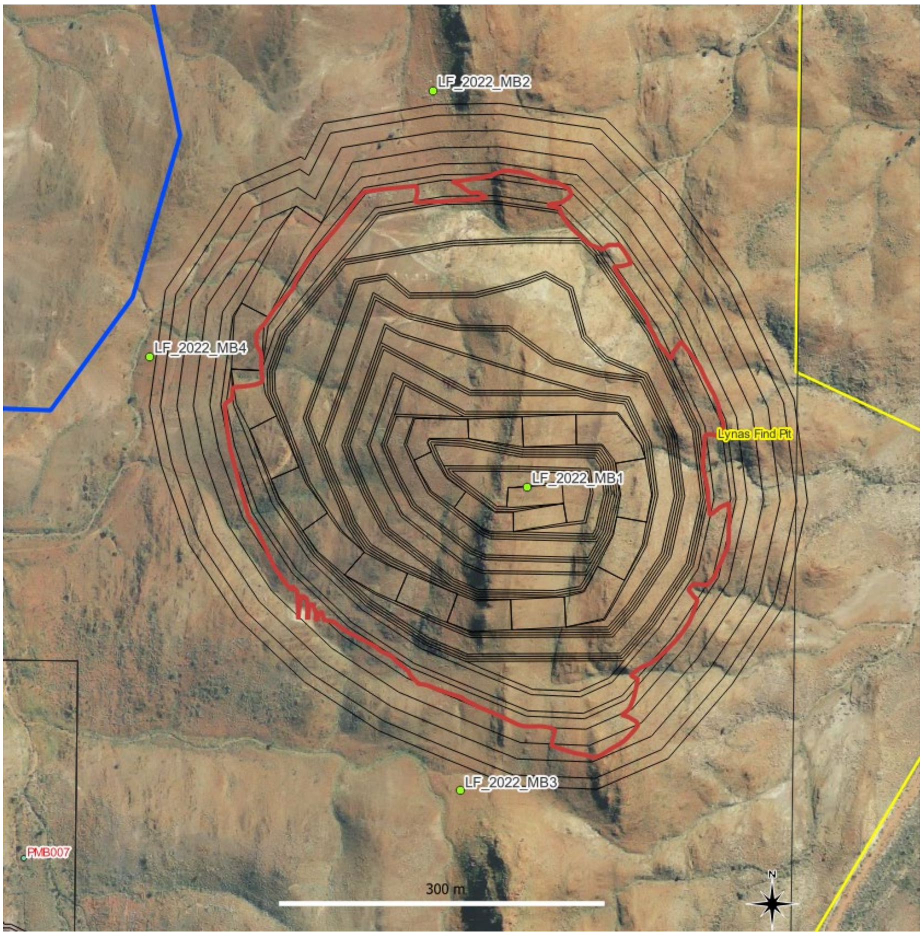

Figure 8 Suggested monitoring bore positions

9. References

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